Claims

1. A smart instrument for use in a surgery system, comprising:

a housing;

a plurality of light emitting diodes coupled to the housing and being adapted to fire independently; and,

a transceiver adapted to communicate with the surgery system.

2. A smart instrument, as set forth in claim 1, wherein the smart instrument includes a memory circuit for storing information related to the smart instrument.

3. A smart instrument, as set forth in claim 2, wherein the smart instrument is adapted to transmit via the transceiver the information stored on the memory circuit in response to a received signal.

4. A smart instrument, as set forth in claim 1, wherein the smart instrument includes a status light.

5. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be for a specific purpose.

6. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be used as a pointer.

7. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be used as a scalpel.

8. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be used as a probe.

9. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be used as a validation tool for other smart instruments.

10. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be used as a suction device.

11. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be used as a pin.

12. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be used as a clamp.

13. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be interchangeably coupled with a plurality of generic instruments.

14. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be interchangeably coupled with a patient tracking system.

15. A smart instrument, as set forth in claim 1, wherein the smart instrument is adapted to be interchangeably coupled with a patient tracking system and at least one generic instrument.

16. A smart instrument, as set forth in claim 1, wherein the smart instrument includes an activation button.

17. A smart instrument, as set forth in claim 16, wherein the smart instrument is adapted to transmit via the transceiver information stored on a memory circuit in response to a received signal.

18. A smart instrument, as set forth in claim 17, wherein the information includes a status of the activation button.

19. A smart instrument, as set forth in claim 1, wherein the smart instrument includes a plurality of control buttons for remotely controlling the surgery system.

20. A smart instrument, as set forth in claim 19, wherein the smart instrument is adapted to transmit via the transceiver information stored on a memory circuit in response to a received signal.

21. A smart instrument, as set forth in claim 20, wherein the information includes a status of control buttons.

22. A smart instrument, as set forth in claim 1, wherein the smart instrument includes an up button, a select button, and a down button.

23. A smart instrument for use in a surgery system, comprising:

a housing;

a plurality of light emitting diodes coupled to the housing and being adapted to fire independently;

a transceiver adapted to communicate with the surgery system;

an activation button;

an adapter interface coupled to the housing; and,

a release button operatively couple to the adapter interface, where the smart instrument is adapted to be interchangeably coupled with a patient tracking system and at least one generic instrument.

24. A smart instrument, as set forth in claim 23, including a memory circuit for storing information related to the smart instrument.

25. A smart instrument, as set forth in claim 24, wherein the information stored on the memory circuit is updated by the surgery system.

26. A smart instrument, as set forth in claim 24, wherein the information stored on the memory circuit includes calibration information.

27. A smart instrument, as set forth in claim 26, wherein the calibration information is updateable using a calibration station.

28. A smart instrument, as set forth in claim 24, wherein the smart instrument further includes a validation point for validating other smart instruments.

29. A smart instrument for use in a surgery system, comprising

a housing;

a plurality of light emitting diodes coupled to the housing and being adapted to fire independently;

a transceiver adapted to communication with the surgery system;

a plurality of control button for remotely controlling the surgery system; and,

a work tip coupled to the housing.

30. A smart instrument, as set forth in claim 29, including a memory circuit for storing information related to the smart instrument.

31. A smart instrument, as set forth in claim 30, wherein the information stored on the memory circuit is updated by the surgery system.

32. A smart instrument, as set forth in claim 30, wherein the information stored on the memory circuit includes calibration information.

33. A smart instrument, as set forth in claim 32, wherein the calibration information is updateable using a calibration tool.

34. A smart instrument, as set forth in claim 29, wherein the smart instrument further includes a validation point for validating other smart instruments.

35. A surgery system, comprising:

at least one smart instrument;

a computer system;

a sensor system adapted to wirelessly sense the position of the at least one smart instrument and to transmit position information to the computer system.

36. A surgery system, as set forth in claim 35, wherein the at least one smart instrument includes a memory circuit for storing information related to the smart instrument, and wherein the at least one smart instrument is adapted to wirelessly transmit the information to the computer system.

37. A surgery system, as set forth in claim 36, wherein the information includes calibration information.

38. A surgery system, as set forth in claim 35, wherein the sensor system uses infrared signals.

39. A surgery system, as set forth in claim 35, wherein the sensor system uses radio frequency signals.

40. A surgery system, as set forth in claim 35, wherein the sensor system uses the IEEE 802.11 communication standard.

41. A surgery system, as set forth in claim 35, wherein the sensor system includes a sensor array.

42. A surgery system, as set forth in claim 35, wherein the sensor array includes at least one linear CCD camera and an infrared transceiver.

43. A surgery system, as set forth in claim 35, wherein the sensor array includes three linear CCD cameras and at least one infrared transceiver.

44. A surgery system, as set forth in claim 35, wherein the computer system includes a monitor.

45. A surgery system, as set forth in claim 44, wherein the computer system is adapted to display a diagram of a patient on the monitor.

46. A surgery system, as set forth in claim 45, wherein the diagram is of one of an image, picture, outline and line drawing of at least a portion of the patient.

47. A surgery system, as set forth in claim 45, wherein the computer system is adapted to display a representation of the at least one smart instrument on the diagram.

48. A surgery system, as set forth in claim 47, wherein the representation of the at least one smart instrument is a line.

49. A surgery system, as set forth in claim 47, is a graphic.

50. A surgery system, as set forth in claim 35, wherein the computer assembly includes:

a localizer coupled to the sensor system;

a computer workstation coupled to the localizer; and

a monitor coupled to the computer workstation.

51. A surgery system, as set forth in claim 50, wherein the at least one smart instrument includes a plurality of infrared light emitting diodes.

52. A surgery system, as set forth in claim 51, wherein the localizer is adapted to receive the position information from the sensor system, determine a relative position of each of the plurality of infrared light emitting diodes.

53. A surgery system, as set forth in claim 52, wherein the localizer is adapted to transmit the relation positions of the plurality of infrared light emitting diodes to the computer workstation.

54. A surgery system, as set forth in claim 52, wherein the localizer is adapted to determine a relative position and orientation of the at least one smart instrument as a function of the relative positions of the plurality of infrared light emitting diodes and transmit the relative position and orientation to the computer workstation.

55. A surgery system, as set forth in claim 35, including:

a patient tracking system;

a universal tracker device coupled to the patient tracking system;

wherein the sensor system is adapted to wirelessly sense the position of the universal tracker device and to transmit position information to the computer system.

56. A surgery system, as set forth in claim 55, wherein the universal tracker device includes a validation point.

57. A surgery system, as set forth in claim 56, wherein the validation point is used to validate the at least one smart instrument.

58. A surgery system, comprising:

at least one smart instrument;

a patient tracking system;

a universal tracker device coupled to the patient tracking system;

a localizer;

a computer workstation coupled to the localizer;

a monitor coupled to the computer workstation;

a sensor system coupled to the localizer and being adapted to wirelessly sense the position of the at least one smart instrument and the universal tracker device and to transmit position information to the localizer.

59. A surgery system, as set forth in claim 58, wherein the at least one smart instrument includes first plurality of infrared light emitting diodes and the universal tracker device includes a second plurality of light emitting diodes, wherein the localizer is adapted to receive the position information from the sensor system and to determine a relative position of each of the first and second plurality of infrared light emitting diodes.

60. A surgery system, as set forth in claim 59, wherein the localizer is adapted to transmit the relation positions of the first and second plurality of infrared light emitting diodes to the computer workstation.

61. A surgery system, as set forth in claim 59, wherein the localizer is adapted to determine a relative position and orientation of the at least one smart instrument and the universal tracker device as a function of the relative positions of the first and second plurality of infrared light emitting diodes and transmit the relative position and orientation of the at least one smart instrument and the universal tracker device to the computer workstation.

62. A surgery system, comprising:

at least one smart instrument;

a patient tracking system;

a universal tracking system having a validation point and being coupled to the patient tracking system;

a localizer;

a computer workstation coupled to the localizer;

a monitor coupled to the computer workstation; and,

a sensor system adapted to wirelessly sense the position of the at least one smart instrument and to transmit position information to the localizer, wherein the validation point is used to validate the at least one smart instrument.

63. A surgery system, comprising:

at least two smart instruments;

a computer system;

a sensor system adapted to wirelessly sense the position of the at least two smart instruments and to transmit position information to the computer system.

64. A surgery system, as set forth in claim 63, wherein the computer system includes a monitor and wherein the computer system is adapted to display a diagram of a patient on the monitor.

65. A surgery system, as set forth in claim 64, wherein the computer system is adapted to display a representation of one of the at least two smart instruments on the diagram.

66. A surgery system, as set forth in claim 65, wherein the one of the at least two smart instruments is in use.

67. A surgery system, as set forth in claim 66, wherein the computer system is adapted to alternatively determine the position of the at least two smart instruments.

68. A surgery system, as set forth in claim 66, wherein the computer system is adapted to only determine the position of the one of the at least two smart instruments.

69. A surgery system, comprising:

a sheet of flexible material having a plurality of markers on a first side;

a smart instrument adapted to be placed in contact with the plurality of markers;

a computer system;

a sensor system adapted to wirelessly sense the position of the at least one smart instrument and to transmit position information to the computer system.

70. A surgery system, as set forth in claim 69, wherein the flexible material is a mesh.

71. A surgery system, as set forth in claim 69, wherein the sheet of flexible material includes a layer of adhesive on another side.

72. A validation tool for validating a smart instrument in a surgery system, comprising:

a base;

four columns coupled to the base;

at least one validation point coupled to one of the four columns; and,

a plurality of infrared light emitting diodes coupled to the base.

73. A calibration tool for calibrating a smart tool in a surgery system, comprising:

a base;

four columns coupled to the base;

a plurality of infrared light emitting diodes coupled to the base; and,

an upper plate and a lower plate slidably coupled to the four columns, the upper and lower plates each including an aperture for receiving the smart tool during a calibration process.

74. A surgery system, comprising:

at least one smart instrument;

a validation tool, the validation tool including:

a base;

four columns coupled to the base;

at least one validation point; and,

a plurality of infrared light emitting diodes coupled to the base; and,

a computer system;

a sensor system adapted to wirelessly sense the position of the at least one smart instrument and the calibration tool and to transmit position information to the computer system, wherein the validation tool is adapted to validate the at least one smart instrument.

75. A surgery system, comprising:

at least one smart instrument;

a calibration tool, the validation tool including:

a base;

four columns coupled to the base;

a plurality of infrared light emitting diodes coupled to the base;

an upper plate and a lower plate slidably coupled to the four columns, the upper and lower plates each including an aperture for receiving the smart tool during a calibration process; and

a computer system;

a sensor system adapted to wirelessly sense the position of the at least one smart instrument and the calibration station and to transmit position information to the computer system, wherein the calibration station is adapted to calibrate the at least one smart instrument.

76. A surgery system, comprising:

a smart instrument being composed of a flexible material; and having a plurality of light emitting diodes on a first side;

a computer system; and,

a sensor system adapted to wirelessly sense the position of the plurality of light emitting diodes and to transmit position information to the computer system.

77. A surgery system, as set forth in claim 76, wherein the computer system is adapted to determine the contour of the smart instrument and perform a surface matching operation with a known contour.

78. A surgery system, as set forth in claim 76, wherein the smart instrument is part of a dynamic reference frame.

79. A surgery system, comprising:

at least one smart instrument, having at least one control button

a computer system; and,

a sensor system adapted to wirelessly sense the position of the at least one smart instrument and to transmit position information to the computer system and to transmit status information of the at least one control button, wherein the computer system is adapted to perform an operation based on the activation of the control button and the position of the at least one smart instrument.

Patent Pending